LEGISLATIVE RESPONSES TO AIR AND WATER POLLUTION

I. INTRODUCTION

Pollution is a phenomenon of ancient origin that has spread with the growth of population and technology. Today it threatens to destroy man's habitable environment. Until recently that hazard attracted little general notice, though sporadic control efforts have been underway for hundreds of years. Early government regulations tended to treat pollution as a nuisance, an industrial health problem or a hazard to navigation, and were of mainly local effect, usually confined to areas where immediate injury was threatened. The longer range consequences, even if recognized, were ignored as being either a concomitant of progress or ultimately remediable by nature with a hand from man. A world that had come to see technology as the answer to all its problems could hardly be expected to quibble over a few unpleasant by-products.

Events following the second World War proved this attitude hopelessly sanguine. Driven by growing affluence and demand, world industry turned its war-time know-how to the production of a vast profusion of complex new products, many of which are nondegradable by nature. Detergents have replaced soaps. Plastics have replaced paper and wood. DDT has replaced tobacco products as a pesticide. The new products are cheap and effective and can be produced in virtually unlimited quantities. Unfortunately, once produced, they rarely decompose but rather accumulate on the land, in the streams and oceans and even in the atmosphere. The burden on what were once thought to be the limitless reservoirs of nature is rapidly becoming unacceptable as the natural processes of oxidation, decay and wear are overwhelmed. Each year more beaches are closed, more rivers are declared unfit as water sources and more cities issue air pollution alerts. Public disenchantment with dirty water and smelly skies has begun to reach the level of a grass-roots political movement that is finally attracting the attention of the state and national legislatures.

Many who claim to be knowledgeable about environmental problems feel that projected future human needs for food, air, water and habitation cannot much longer be met unless pollution accumulation rates are reversed and existing resources cleaned up. Techniques are largely available to accomplish this result, but rational attempts await an even remotely acceptable plan for meeting the costs without producing serious economic dislocations. Suggestions include tax-supported control and clean-up programs, aggressive policing of industry and enforced economic growth limitations. Given the public's enchantment with material comfort, the pressure for improved living standards from the world's underprivileged and the political nature of governmental processes, any of these

programs is difficult to implement. In the meantime, pollution increases and the margin of economically useable resources dwindles.

With their politically realistic choices limited to efforts that appear to attack the problem of pollution without burdening growing world affluence, local and national governments have been experimenting with incentive-motivated voluntary controls. States offer tax incentives to industry to defray the costs of installing and operating pollution control facilities. The federal government couples similar subsidies with certification programs established and enforced by the states. There are, of course, objective state and federal standards in specific areas which are enforceable by equitable or criminal penalties, but wherever such enforcement would cause even modest economic dislocation, it is often delayed or withheld entirely. The result is that where pollution control is economically disadvantageous to an industrial or commercial polluter, as it usually is, governmental incentive and penalty schemes are largely ineffective.

Whatever its shortcomings, the United States has unquestionably launched a major legislative attack on environmental pollution. An attempt has been made in the following pages to show what is being done and why it is failing. To appreciate the risks occasioned by further failure, some understanding of the prevalence and burden of pollution is necessary. The topic is vast and laced with disagreement but even a brief summary shows that our finite planet is confronted with a growing problem having potentially disastrous consequences. A few suggestions for remedial public and private action are offered in conclusion.

II. THE PROBLEM

A. *In the Beginning*

Pollution is neither a uniquely modern phenomenon nor solely man made. In the sense of a foreign intrusion into the "normal" environment, it has been going on since the earth began to form. The changes wrought by catastrophic environmental convulsions were essential ingredients in the evolutionary process that led to the arch polluter, man. In the abysmal recesses of geologic time, the miasmic effluvium consisted primarily of methane, ammonia and water. The first organisms that developed from that primordial soup lived by fermentation and produced carbon dioxide. From them, over several billion years, evolved plants that by photosynthesis converted most of the carbon dioxide to oxygen. Some of the oxygen combined into ozone, and for the first time, the earth's surface was shielded from the sun's deadly ultraviolent radiation, freeing life from its confinement in the sea.[1]

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[1] B. COMMONER, THE CLOSING CIRCLE 14-22 (1971).

The face of the land is constantly being altered by natural processes. Since the earth cooled, ice sheets have advanced, destroying life in their path only to retreat again. Volcanoes have erupted casting cubic miles of ash into the air and blackening the sky. As late as 1815, the eruption of Mount Tambora in Indonesia lowered summer temperatures in England by five degrees.[2] Agricultural output suffered everywhere. Erosion, a process as old as the wind and the waves, still contributes more pollutants by weight than any other source.[3]

When nature was quiet, man added his contribution. Archaeological excavations of the earliest building sites reveal cities erected on the dung hills of villages that died in their own defilement.[4] Troy is reputed to have risen nine times on the same hill[5] though Greece had a hand in one demise. Staying alive was more important than staying clean, but ancient man not only fouled his own nest, he also blighted vast areas of once rich soil. The Tigris-Euphrates Valley, the cradle of urban civilization,[6] was probably ruined by salinity from over-irrigation.[7] The vast Sahara, still advancing at the rate of several miles a year, is largely manmade.[8] The arid lands of China and Western India were once lush forests.[9] Deserts and wastelands have increased from 9.4 per cent of the world's land area in 1882 to 23.3 per cent in 1952.[10] So far, man has survived the fruits of his folly, but many of his neighbors have not. Since the time of Christ, two per cent of the known species of mammals have been exterminated directly or indirectly through man's efforts, and the rate of extermination is increasing exponentially.[11] One sober journal predicts that, if the trend continues, all the remaining 4000 species, except domestic animals, could be gone in 30 years.[12]

If early man was concerned with the effect of his depredations, he left few records. The Western Judeo-Christian tradition, as reflected today in our worship of progress, holds that nature is an enemy to be subdued into slavery.[13] It was probably concern for his own convenience that motivated Edward the Confessor's 1065 A.D. order to destroy the mills and

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[2] P. EHRLICH & A. EHRLICH, POPULATION, RESOURCES, ENVIRONMENT 146-47 (1970).

[3] ENVIRONMENTAL QUALITY, THE SECOND ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY 148 (August 1971) [hereinafter cited as SECOND ANNUAL REPORT].

[4] H. STILL, THE DIRTY ANIMAL 14 (1967).

[5] 22 ENCYCLOPAEDIA BRITANNICA 505-06 (1966).

[6] W. MCNEILL, THE RISE OF THE WEST 29-30 (1963).

[7] Revelle, *Water*, 209 SCIENTIFIC AMERICAN 93, 100 (Sept. 1963).

[8] P. EHRLICH, *supra* note 2, at 166.

[9] *Id.*

[10] *Id.*

[11] Ripley, *Extinction's Tide and The Ripples and Eddies of Hope*, SMITHSONIAN, Feb. 1972 at 24.

[12] *Id.*

[13] *See Genesis* 1: 27, 28; 9: 2; Kellermann, *Ecology: A World Concern*, in THE GREAT IDEAS TODAY 21 (1971).

fisheries and restore the royal rivers of England, the first clear record of a stream pollution regulation in history.[14] Down until recent times, however, the evidences of any effort to control pollution have been so sporadic as to be inconsequential.[15]

B. *The Situation Today*

When man was more scattered and virgin lands existed, pollution was a nuisance that directly affected few, and they could move away from it. Today the earth is crowded, and the accumulations of filth and poison are harder to avoid. The vast reservoirs of the earth that once soaked up the litter and slowly rendered it harmless are filling up. Lake Erie, which has produced millions of pounds of sturgeon and whitefish, is rapidly turning into an irrecoverable, algae swamp inhabited by catfish and carp.[16] The very rivers that feed it burst into flame from discarded matches.[17] Less than 10 per cent of the entire U.S. watershed is considered to be unpolluted or just moderately polluted,[18] and, astonishingly, the worst pollution occurs in the relatively thinly populated Northern Plains.[19] During the 1960's, the Public Health Service rated the water supplies of more than 60 American cities, including Fort Myers, Florida and Fairbanks, Alaska, as "unsatisfactory" or a potential health hazard.[20] Lest there be any mistake about the pervasiveness of pollution, it is well to note that in 1970 Thor Heyerdahl, the Norwegian explorer, drifted through 4000 miles of solidified oil,[21] the total extent of which may equal the amount of ocean surface plant life,[22] the indispensable source of 60 per cent of our atmospheric oxygen.[23]

Dirty waster is expensive not only to clean but also because of its

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[14] H. STILL, *supra* note 4, at 87-88.

[15] In 1306, Edward I issued a royal proclamation prohibiting artificers from using sea coal in their furnaces on pain of execution. *See* State v. Mundet Cork Corp., 8 N.J. 359, 365, 86 A.2d 1, 4 (1952). In 1611, an English Court granted an injunction on a showing that plaintiff's air had been corrupted by defendant's hog sty. William Alfred's Case, 77 Eng. Rep. 816 (K.B. 1611). Until about 1815 the discharge of any wastes, other than kitchen slops, into the drains of London was prohibited by law. In Paris the same policy continued until 1880. Wolman, *Washing Our Dirty Water*, in 1972 BRITANNICA YEARBOOK OF SCIENCE AND THE FUTURE 368 (1971). Dr. John Snow dramatically demonstrated in 1854 that cholera could be transmitted by a contaminated well. He removed the handle of London's Broad Street pump and stopped the spread of a virulent epidemic. Foreword, OHIO'S ENVIRONMENT, OHIO DEPARTMENT OF HEALTH, BUREAU OF ENVIRONMENTAL HEALTH (no date).

[16] B. COMMONER, *supra* note 1, at 94-97.

[17] Kellermann, *supra* note 13, at 18.

[18] SECOND ANNUAL REPORT 218.

[19] *Id.* at 220.

[20] P. EHRLICH, *supra* note 2, at 126.

[21] Kellermann, *supra* note 13, at 20.

[22] NEW YORKER, Jan. 31, 1970, at 28.

[23] BATTELLE RESEARCH OUTLOOK, CLEANING UP THE ATMOSPHERE, BATTELLE MEMORIAL INSTITUTE 6 (Vol. 2, No. 3, 1970). *See also* B. COMMONER, *supra* note 1, at 227.

effects. The harvesting of aquatic animals provides food and work for millions. But fish kills in the United States from pollution have grown from 6 million in 1960 to 41 million in 1969,[24] while one fifth of U.S. commercial shellfish beds have been closed because of pollution.[25] What fishing remains has become hazardous, causing hundreds of deaths in Japan over the last 20 years from ingested poisons.[26] The increased use of fertilizers has leached nitrates into the streams and wells that serve as human water sources. Doctors in California's central valley have recommended that babies be given only bottled water to protect them from a resulting disease which can terminate in suffocation.[27] The problem has become world wide.[28] Increasing population and increasing industrial effluent burdens on water systems complicate the problem of sewage treatment.[29] As a result, large quantities of human wastes enter the world's water courses causing disease and death. Four hundred thousand people are estimated to have contracted cholera from polluted water in 1970 alone.[30]

In 1306, Edward I prohibited the burning of sea coal in London to reduce smoke.[31] In 1952, over 4000 Londoners died in a sooty smog.[32] The 12,000 citizens of Donora, Pennsylvania were luckier when smog enveloped their valley in 1948. Though 6000 became ill, only 20 died.[33] Luckier still were the citizens of Los Angeles and St. Louis who were merely warned not to take a deep breath.[34] Fortunately for New Yorkers, the risk of lung cancer from just breathing is no worse than from inhal-

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[24] SECOND ANNUAL REPORT 220. *See also* B. COMMONER, *supra* note 1, at 96.

[25] Kellermann, *supra* note 13, at 20.

[26] *Id.* at 19.

[27] The disease is methemoglobinemia, which prevents the transport of oxygen by the blood. It is serious in California, Illinois, Wisconsin and Missouri and has been reported in France, Germany, Czechoslovakia and Israel. The city of Elgin, Minnesota, was forced by nitrate pollution to find a new water supply. Agriculture Department officials estimate the use of inorganic nitrogen fertilizers will increase 10 times between 1970 and 2000. P. EHRLICH, *supra* note 2, at 127-28; B. COMMONER, *supra* note 1, at 81-93.

[28] B. COMMONER, *supra* note 1, at 82.

[29] The average city dweller directly or indirectly produces 120 gallons of sewage, four pounds of solid refuse and 1.9 pounds of air pollutants per day. H. STILL, *supra* note 4, at 28. As of 1970, the wastes of about 30 million Americans were discharged without any treatment while the wastes of an additional 30 million received treatment inadequate by federal standards. Wolman, *Washing Our Dirty Water*, in 1972 BRITANNICA YEARBOOK OF SCIENCE AND THE FUTURE 369 (1971). Within the next 50 years, municipal waste discharges will increase by 400 per cent. The annual volume of industrial waste discharges is more than three times that of municipal wastes and is growing several times as fast. Over 1000 communities outgrow their treatment facilities every year. W. HURLEY, ENVIRONMENTAL LEGISLATION 3-4 (1971).

[30] Wolman, *supra* note 15, at 372.

[31] *Supra* note 15.

[32] H. STILL, *supra* note 4, at 135.

[33] P. EHRLICH, *supra* note 2, at 120.

[34] *Id.*

ing two packs of cigarettes a day.[35] The culprits are a group of simple gases that originate in the combustion processes which drive the economy. These gases are primarily carbon monoxide, the sulfur oxides and the nitrogen oxides,[36] most of which currently come from automobile exhausts, with power plants a distant second.[37]

The economic and health costs of air pollution are staggering. The costs associated with pollution-caused human morbidity and mortality alone are estimated to be $6 billion annually[38] while direct costs of crop and materials damages are $4.9 billion annually.[39] Included among such otherwise unnecessary costs are $800 million for cleaning and dyeing, $240 million for car washing and $100 million for painting.[40] In spite of these heroic maintenance efforts, property values suffer an annual erosion of $5.2 billion from the effects of air pollution. The total yearly per capita bill comes to $80 per person.[41]

A new element entered the pollution picture in the middle third of the 20th century. Until that time, man's manufacturing techniques generally tended to change the form rather than the composition of the materials found in nature. When not overwhelmed by sheer volume, the natural processes of oxidation, decay and wear tended to reduce waste to its original constituents and return them to their ecological cycles. But the explosion of technology during and after World War II, especially in organic chemistry, changed that. For example, the prewar litter of rags and papers was deplorable, but, left to time, natural enzymes reduced the mass to humus that enriched the soil.[42] Plastics, on the other hand, some tougher than steel, have no natural enemies and merely accumulate to poison the environment.[43] The same is true of a vast number of the complex new chemical compounds that have been devised to enrich our lives, such as detergents (at least, the non-biodegradable versions),

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[35] B. COMMONER, *supra* note 1, at 77.

[36] Carbon monoxide displaces oxygen in the blood tending to cause suffocation which makes the heart and respiratory mechanisms work harder. Breathing air containing 80 parts per million has the same effect as losing a pint of blood. In badly snarled traffic, the carbon monoxide content of the air may approach 400 parts per million. Sulfur oxides create sulphuric acid in the lungs which is harshly irritating to the respiratory passages and may cause chronic asthma, bronchitis and emphysema. Nitrogen oxides also reduce the oxygen carrying capacity of the blood. P. EHRLICH, *supra* note 2, at 119-22. When activated by sunlight, nitrogen oxides combine with organic compounds such as waste gasoline to produce the photochemical haze familiar to Los Angeles residents as smog. B. COMMONER, *supra* note 1, at 68.

[37] SECOND ANNUAL REPORT 212.

[38] *Id.* at 106.

[39] *Id.* at 106-07.

[40] ENVIRONMENTAL QUALITY, THE FIRST ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY 72 (August 1970) [hereinafter cited as FIRST ANNUAL REPORT].

[41] SECOND ANNUAL REPORT 107.

[42] *See* B. COMMONER, *supra* note 1, at 158-66.

[43] *Id.* at 162.

DDT[44] and hexachlorophene. There are approximately half-a-million of these man-made chemical products in use today, the environmental effect of the greater part of which, either singly or in combination, is essentially unknown.[45] With each passing year, these products accumulate in our dumps, our rivers, our oceans[46] and our bodies.[47] Barring some unexpected adaptation by nature, they will presumably be there forever.

C. *The Future*

But in spite of the deterioration of our environment, life goes on. In fact, Jay Forrester's Massachusetts Institute of Technology megacomputer reports that our quality of life is at or near an all-time high.[48] The present costs are obviously within our means. Is there any evidence that they are becoming unacceptable? Recent events suggest they are.[49] Human life is possible only within a very narrow range of temperatures. There are already large areas of the earth into which man must take food and bodily protection to survive. The hospitable areas, the areas essential for food production, exist through a unique and possibly precarious balance of features: albedo, carbon dioxide and ozone.[50] Albedo, the reflectivity of the earth's surface, determines the amount of the sun's heat that will be reflected back into space. Atmospheric carbon dioxide blocks the escape of reflected heat, and ozone filters out hazardous ultraviolet radiation. Since 1880, the amount of atmospheric carbon dioxide has increased by 12 per cent[51] with an accompanying increase in average world temperatures. Latest observations show that the 1969 and 1970 rates of increase were twice that of the 1958 to 1968 period.[52] Somewhat offsetting the carbon dioxide greenhouse effect[53] has been the increased albedo

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[44] It has been computed that about 25 per cent of all the DDT produced is now in the ocean. B. COMMONER, *supra* note 1, at 227. DDT reduces photosynthesis in marine phytoplankton, the tiny green ocean plants primarily responsible for the food we take from the sea. If marine photosynthesis ceased, all sea life would die, P. EHRLICH, *supra* note 2, at 179, and the source of 60 per cent of our atmospheric oxygen would have been eliminated BATTELLE RESEARCH OUTLOOKS, *supra* note 23, at 6.

[45] *A Blueprint for Survival*, N.Y. Times, Feb. 5, 1972, at C 29.

[46] Sea nets pick up increasing amounts of often gayly colored fibers. B. COMMONER, *supra* note 1, at 163.

[47] The fatty tissue of patients who die of brain softening, cerebral hemorrhage, hypertension, cirrhosis of the liver and various cancers, show significantly higher concentration of DDT than that of patients who die of infectious diseases. P. EHRLICH, *supra* note 2, at 131.

[48] J. FORRESTER, WORLD DYNAMICS 70 (1971).

[49] *Eg.*, 99.94 per cent of the world's water is tied up in the oceans and ice caps. The remainder is being used up at a rate which will exceed the supply in less than eight years. P. EHRLICH, *supra* note 2, at 65.

[50] *Id.* at 145-48.

[51] *Id.* at 146. *See also* 223 SCIENTIFIC AMERICAN 78 (Sept. 1970).

[52] SECOND ANNUAL REPORT 215.

[53] The air is nearly transparent to the sun's radiation that warms the earth's surface. Carbon dioxide, however, absorbs the heat radiated *from* the earth and sends about half of it back to the surface. P. EHRLICH, *supra* note 2, at 145.

of the thickening veil of pollution that covers the planet.[54] Should this precarious balance break down,[55] the earth could be thrown into another ice age, or the vast polar ice sheets might melt, depending on which way the temperature pendulum swings.[56] Because of the substantially lower reflectivity of open water, the melting of the polar ice sheets once started could become a rapidly accelerating phenomenon, raising the seas 60 to 200 feet[57] and inundating vast areas of the world's most populous and fertile land. Such changes are known to have occurred abruptly in the past. For whatever reason, the seas experienced an almost instantaneous drop in temperature 89,500 years ago that wiped out the warm water life of the Gulf of Mexico and left it barren until cold water species appeared seven centuries later.[58] It is also known that we have been basking in 10 centuries of unusually warm weather which may have made possible the birth and flowering of human civilization.[59] Scientists consider these current climatic conditions to be unstable and subject to disturbance by pollution effects.[60] Needless to say, a return to "normal" temperatures could have catastrophic effects on food production. As mentioned earlier, an essential requirement for life *on* earth is protection from the sun's ultraviolet radiation. The ancient ozone shield, which filters out that harmful or fatal radiation, will soon be threatened, perhaps irremediably, by the nitric oxide exhaust component from supersonic transports.[61] Integrating these risks with those discussed earlier, a 1968 UNESCO Conference[62] concluded that man has only about another 20 years before the planet begins to become uninhabitable. Jay Forrester's detailed computer models of our world system project an abrupt decline in the quality of life unless carefully considered steps are implemented promptly.[63]

III. CONTROL EFFORTS

A. *The Choices*

The continued accumulation of pollutants[64] suggests that current con-

[54] *Id.* at 146.

[55] N.Y. Times, Feb. 5, 1972, at 14 C.

[56] P. EHRLICH, *supra* note 2, at 147-48. It is important to note that the meteorological effects produced by temperature changes are sometimes counter-instinctual. A warming of the arctic regions could produce a northern shift in the position of storm tracks bringing increased snow and another age of glaciation. *Id.* at 147.

[57] *Id.* at 148.

[58] N.Y. Times, Feb. 5, 1972, at 14 C.

[59] *Id.*

[60] For only two or three per cent of the last 400,000 years has the world been as warm as it is today. *Id.*

[61] ENCYCLOPEDIC ALMANAC 1972, THE NEW YORK TIMES 478-79 (1971).

[62] P. EHRLICH, *supra* note 2, at 118.

[63] J. FORRESTER, *supra* note 48, at 120-22.

[64] More of every major air pollutant was emitted in 1969. SECOND ANNUAL REPORT 212.

trol efforts are inadequate. Several aspects of the problem dictate that the responsibility for environmental quality must lie primarily with government, local and national, rather than with the private sector. First, there is the fact that human waste treatment is only practical on the community level. Second, the costs of massive cleanups and even some prevention programs are beyond the present resources of private enterprise without serious dislocations in the interrelationships of the various industries and grave effects on foreign trade. The estimated pollution control burden on paper producers, for instance, is eight times higher per dollar of shipment than that on plastics producers.[65] Forcing a private solution on these companies could have the economic effect of flooding the country with non-degradable paper substitutes. Third, the profit motive, which fuels the private sector, subjects the making of uneconomic decisions to the peril of defeat in the market place. Any company that voluntarily adds the cost of pollution control to the price of its products may win the applause of the public but lose its essential patronage.

Government's responsibilities for pollution control can be exercised in three ways: finance, regulation and a combination of these. Finance can be further subdivided into government financing and operation of pollution control facilities, government grants for the construction and operation of private facilities and indirect financial incentives for private pollution control. The indirect incentives include tax relief which, as we shall see, differs from a grant only in form. Regulation can be subdivided into the usual statutory, administrative and judicial forms imposing civil, criminal or quasi-criminal sanctions. Combination programs are limited only by man's fertile, but to date imperfect, imagination.[66] This paper will briefly consider current federal and state statutes dealing with air and water quality control and then concentrate on an analysis of the efficacy of industrial pollution abatement tax incentives.

B. *The Costs*

Cursory reflection shows the complexities with which government air and water quality control programs must deal. In 1970, existing public water waste treatment facility replacement and maintenance costs were $1.6 billion, almost double the 1965 costs, and these facilities provided secondary (biological) treatment for only 42 per cent of the U.S. popula-

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Overall quality of the nation's waters has deteriorated because of accelerated eutrophication, increased discharges of toxic materials and greater loads of sediment generated by increased use of laundry detergents, pesticides, fertilizers, chemicals and metals. *Id.* at 218. The number of reported 100 or greater barrel oil spills in U.S. waters increased from 67 in 1969 to 92 in 1970. *Id.* at 220. Year-to-year peak week U.S. electrical production increased by 9.3 per cent in 1969 and 5.5 per cent in 1970. BATTEE RESEARCH OUTLOOK, *supra* note 23, at 21.

[65] SECOND ANNUAL REPORT 123.

[66] *See* note 64, *supra.*

tion.[67] Through 1975, another $22.9 billion will be required to meet federal and state water quality standards.[68] American industry discharges several times the waste water volume of the entire sewered population[69] and that volume is growing several times as fast.[70] What is perhaps more significant, the total biochemical oxygen demand (BOD)[71] of industrial wastes in 1968 was four to five times that of domestic sewage.[72] About 50 per cent of the wastes treated in municipal plants[73] are industrial wastes, which suggests that such plants currently afford secondary treatment to about 10 per cent of the industrial BOD. To treat the remainder, American industry in 1970 invested $625 million for new facilities and $575 million to operate existing facilities.[74] Industry's actual new facility and replacement expenditures are expected to average about $1 billion per year through 1974, far short of the $9.3 billion that will be required to meet currently projected federal and state standards through 1975.[75] The ratio of estimated to required industry expenditures shows that most industrial wastes will continue to go untreated. No provision is made in these costs to deal with pollution from mining operations or marine vessels, erosion or sediment problems or land reclamation.[76] It is obvious from the amount of untreated waste still being produced that in spite of the expenditure of $3.1 billion in 1970 alone U.S. waters are being polluted at an increasing rate.[77]

The air pollution picture is better but not satisfactory. After dropping for several years, the nationwide emission of air pollutants increased in 1969.[78] The contribution of transportation, primarily automobiles, which is greater than that of all other air pollution sources combined, has apparently peaked. Pollution control devices installed under the pressure of federal and state compulsory and progressive standards are expected to reduce auto emission levels until the late 1970's when increased vehicle numbers may reverse the trend.[79] The per car incremental price of these

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[67] Of the remainder, the waste of 35 per cent receives no treatment, while that of 24.5 per cent receives settlement treatment only. SECOND ANNUAL REPORT 145.

[68] *Id.* at 111.

[69] *Id.* at 146.

[70] FIRST ANNUAL REPORT 32.

[71] BOD is the measure of the amount of oxygen used in five days by the biological processes involved in the stabilization of organic matter. SECOND ANNUAL REPORT 217.

[72] *Id.* at 146.

[73] *Id.* at 147.

[74] *Id.*

[75] For estimated expenditures *see id.* at 147. For required expenditures *see id.* at 111.

[76] *Id.* at 148-49.

[77] *See* note 64, *supra.* Expenditure total for 1970 includes $300 million by private, non-manufacturing sources. SECOND ANNUAL REPORT 111.

[78] SECOND ANNUAL REPORT 212.

[79] *Id.* at 213. Automotive emission control devices are not entirely satisfactory. More than

devices in 1975 is expected to be $240 plus yearly operating and maintenance costs of $20.70.[80] Present public and private expenditures for control of the remaining air pollution sources are running at the 1970 annualized rate of $900 million.[81] To meet federal and state air quality standards by 1976, additional expenditures of $21.2 billion will be required, over two-thirds by stationary power sources[82] which include an electric power industry that is doubling in size every 10 years.[83] Public costs are minimal. They are expected to continue to run at the level of $250 million per year through 1975.[84]

The total public and private expenditures between 1970 and 1976 required to meet federal and state air and water quality standards are estimated to be $61.7 billion.[85]

C. *Federal Statutes*

In America, conservationists were the first classical defenders of nature. Though they were primarily concerned with the beauty and harmony of nature, rather than man's threat to his own existence, they fought to prevent its defilement and destruction by man and his processes from the earliest days of our nation.[86] The conservationist movement was institutionalized in 1849 by the creation of the Department of the Interior, the main governmental agency concerned with the development and protection of our natural resources.

Other early antipollution efforts developed out of a concern for safety of navigation and public health. The first federal water pollution statute, enacted in 1886,[87] prohibited the dumping of refuse in New York Harbor. That and an 1899 act[88] which prohibited the dumping of waste materials into any navigable waterway without a permit were obviously intended to protect navigation from floating obstructions.[89] The 1899 Act had a recent renaissance, however, when the President ordered

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half of the 1968 and 1969 model cars tested by the forerunner of the Environmental Protection Agency failed to meet emission standards. The failure rate of one model was in excess of 80 per cent. W. HURLEY, *supra* note 29, at 52. After only 11,000 miles of driving, 53 per cent of the originally acceptable 1968 models failed to meet the modest emission standards of that year. BATTELLE RESEARCH OUTLOOK, *supra* note 23, at 4.

80 SECOND ANNUAL REPORT 125.

81 *Id.* at 111.

82 *Id.*

83 FIRST ANNUAL REPORT 33. *See* note 64, *supra.*

84 SECOND ANNUAL REPORT 111.

85 *Id.*

86 Kellermann, *supra* note 13, at 24.

87 Act of Aug. 5, 1886, ch. 929, 24 Stat. 329.

88 Rivers and Harbors Act of 1899, ch. 425, § 13, 30 Stat. 1152 (1899), 33 U.S.C. § 407 (1971).

89 F. GRAD, G. RATHJENS, A. ROSENTHAL, ENVIRONMENTAL CONTROL: PRIORITIES, POLICIES, AND THE LAW 57-58 (1971), [hereinafter cited as ENVIRONMENTAL CONTROL].

permits denied to, and enforcement proceedings initiated against, violators of water quality standards.[90] During the first 11 months of 1971, 159 criminal actions were initiated under the 1899 Act resulting in individual fines as high as $125,000.[91] The Public Health Services Act of 1912[92] authorized studies of the public health effect of lake and stream pollution and led to the adoption of standards that have almost completely eliminated waterborne diseases.[93]

The first federal act directed against pollution as an evil in itself was passed in 1948.[94] That Act declared that it was the federal government's policy to aid and support the control efforts of the states and acknowledged their primacy in the field. After one extension,[95] the Act was revised in 1956[96] to change federal support of local sewage plant construction from loans to grants. The initial authorization of $50 million per year[97] was increased to $100 million per year for the period from 1964 to 1967.[98] None of this legislation provided any specific water quality standards for the states to meet.

The Water Quality Act of 1965[99] was the first to declare a "national policy" for the regulation of water pollution.[100] It gave the states until June 30, 1967, to adopt water quality criteria and enforcement machinery, failing which the federal government would impose standards on the states.[101] Sewage plant construction grant authorizations were again increased, to $150 million per year, and grants of $20 million per year were authorized to states and municipalities for the development of new waste treatment methods.[102] Under the Clean Water Restoration Act of 1966,[103] federal water pollution control spending authorization was increased to $1.26 billion in 1971.[104] In applying these acts, the Federal Water Pollution Control Agency stated that any standard that failed to

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[90] Executive Order No. 11574, 3 C.F.R. 188 (1970).

[91] SECOND ANNUAL REPORT 11.

[92] 37 Stat. 309 (1912), *repealed*, Sept. 12, 1950, ch. 946, tit. III, § 301(1)-(29), 64 Stat. 838.

[93] Hines, *Nor Any Drop to Drink: Public Regulation of Water Quality, Part III: The Federal Effort*, 52 IOWA L. REV. 799, 805 (1967).

[94] Water Pollution Control Act of June 30, 1948, ch. 758, §§ 2-13, 62 Stat. 1155, *as amendment* 33 U.S.C. § 1151 *et seq.* (1970).

[95] Act of July 17, 1952, ch. 927, 66 Stat. 755.

[96] Federal Water Pollution Control Act, ch. 518, 70 Stat. 498 (1956), *as amended* 33 U.S.C. § 1151 *et seq.* (1970.

[97] *Id.* §§ 4-6.

[98] Water Pollution Control Act of July 20, 1961, Pub. L. No. 87-88, 75 Stat. 204.

[99] Pub. L. No. 89-234, §§ 1-8, 79 Stat. 903 (1965), *as amended* 33 U.S.C. § 1151 *et seq.* (1970).

[100] *Id.* § 1.

[101] *Id.* §§ 2, 3, 5.

[102] W. HURLEY, *supra* note 29, at 12-13.

[103] Publ. L. No. 89-753, 80 Stat. 1246 (1966) (codified in scattered parts of 33 U.S.C. §§ 431-466A 1970).

[104] W. HURLEY, *supra* note 29, at 14.

at least maintain existing water quality would be unacceptable.[105] The Agency thus abandoned the earlier federal policy of managing waste discharges so as to make maximum acceptable use of water courses as sewers.[106] The new "clean-water" approach requires the best practical treatment or control unless it is shown that a lesser standard provides sufficiently high water quality.[107] The Water and Environmental Quality Improvement Act of 1970[108] is concerned primarily with the control of oil spills[109] and other hazardous substances[110] and does not change the basic structure of federal-state relations that was established in the earlier acts.

The first federal air pollution legislation in 1955[111] was even less effective than the contemporary clean water laws. It provided for research and training grants and denied any intention to invade the sovereignty of the states by the exercise of federal police power.[112] The Clean Air Act of 1963[113] continued to call on the states to act[114] but did provide for the publication of non-mandatory air standards by the Department of Health, Education and Welfare (HEW).[115] Under these acts, increasing grants to the states for control program improvement topped off at $35 million in 1967.[116] This federal pump priming prompted a dramatic increase in the flow of state and local funds into the same programs.[117]

Smarting under California's stiff new emission standards,[118] the automobile industry eased its opposition to proposed federal regulations, and the 1965 Motor Vehicle Air Pollution Control Act resulted.[119] It provided for the establishment and enforcement of new motor vehicle emission standards without participation by the states.[120] The Air Quality Act

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105 U.S. DEPARTMENT OF THE INTERIOR, GUIDELINES FOR ESTABLISHING WATER QUALITY STANDARDS FOR INTERSTATE WATERS (1966).

106 Hines, *supra* note 93, at 573.

107 *Id.*

108 33 U.S.C.A. § 1161 (1970).

109 *Id.* § 1161.

110 *Id.* § 1162.

111 Air Pollution Control—Research and Technical Assistance, ch. 360, §§ 1-7, 69 Stat. 322 (1955), *as amended* 42 U.S.C. §§ 1857-1857f (1966).

112 S. REP. NO. 389, 84th Cong., 1st Sess. 3 (1955).

113 Pub. L. No. 88-206, § 1, 77 Stat., 392 (1963), *as amended* 42 U.S.C.A. § 1857 *et seq.* (Supp. 1972).

114 *Id.* § 1857 (a)(3).

115 *Id.* § 1857 b (c)(2) & (3).

116 *Id.* § 1857 1 (b).

117 The expenditures of non-federal funds for pollution control increased by 46 per cent after the passage of the 1963 Act. Staff HEW, Public Health Service Pub. No. 1549, at 4-7 (1966).

118 *See* testimony of Harry Barr, chairman of the Engr. Advisory Comm. of the Auto. Manuf. Assoc., *Hearings on . . . S. 306 Before the Subcomm. of Public Health and Welfare of the House Comm. on Interstate and Foreign Commerce*, 89th Cong., 1st Sess., at 280 (June 1965).

119 42 U.S.C.A. § 1857f-1 (1971), *amending* 42 U.S.C. § 1857f (1963).

120 *Id.*

of 1967[121] continued to rely on state standards outside the automotive field, though failure of a state to proceed now entitles HEW to promulgate and enforce its own criteria.[122] Regional control plans were emphasized and federal abatement actions were authorized when an imminent and substantial danger to health existed.[123] Appropriations under that Act rose to $134.3 million for 1970[124] and an additional $125 million was earmarked for 1972 research into the contribution of fuels to the contamination of air.[125]

The federal government drastically increased its control over air pollution by the Clean Air Amendments of 1970.[126] Now, the Environmental Protection Agency (EPA) is required to establish national air quality and hazardous substances emission standards, and state implementation plans must be approved by the EPA or are pre-empted. Pursuant to that enactment, the President recently ordered that any facility convicted under the Clean Air Act for noncompliance be barred from federal contracts and from receiving federal aid.[127] Stiff emission standards were set for new automobiles,[128] but those for heavy duty vehicles were later eased in response to heavy pressure from the auto industry.[129] The Environmental Protection Agency also appears to be in retreat on industry emission standards. Though the 1970 Amendments expressly allow states to set and enforce standards higher than the federal, the EPA's latest guidelines warn the states to consider the costs to industry of such action. According to *The New York Times*, the copper industry pressed the Administration for these changes in phrasing in an attempt to have Montana and Arizona ease their tougher standards.[130]

Last year, Congress was asked by the President for a tax on the sulfur content in fuels but did not act. This year, Mr. Nixon has asked for a tax beginning in 1976 on the amount of sulfur oxides emitted: 15 cents a pound in regions failing to meet the primary standards and 10 cents a pound in regions meeting primary but not secondary standards. Big companies would be responsible to measure and report their own emissions. Critics charge that the tax is nothing more than a license to pollute.[131]

As exemplified by the history of air and water pollution control legis-

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[121] 42 U.S.C.A. § 1857 *et seq.* (Supp. 1972).

[122] *Id.* § 1857 d(c)(2).

[123] *Id.* § 1857 d(k).

[124] *Id.* § 1857 1.

[125] 42 U.S.C.A. § 1857 b-1(c) (Supp. 1972), *amending* 42 U.S.C. § 1857 b (1970).

[126] Pub. L. No. 91-604 (Dec. 31, 1970), 42 U.S.C.A. § 1857 *et seq.* (Supp. 1972); 49 U.S.C.A. §§ 1421, 1430 (Supp. 1972); and 50 App. U.S.C.A. § 456 (Supp. 1972).

[127] Executive Order No. 11602, 36 Fed. Reg. 12475 (July 1, 1971).

[128] *See* note 126, *supra.*

[129] N.Y. Times, Feb. 13, 1972, § 1 at 60.

[130] N.Y. Times, Feb. 7, 1972, at 24 C.

[131] N.Y. Times, Feb. 13, 1972, § 4 at 4 E.

lation, the federal government has moved from a posture of denial of power to one of increasing control. In deference to federalism and the traditional state monopoly of police powers, Congress convinced itself that local control would be more effective than national[132] and set about bolstering state resources. Failure of early legislation to stanch the growth of pollution led to a re-evaluation of the federal role.[133] Though the concept of partnership still remains, the responsibility for final decisions has shifted to Washington.[134]

D. *International Attempts*

Pollution is obviously an international problem. Both air and water ignore political boundaries and both are unaffected by conflicting ideologies. Effective control by one nation only slows environmental degradation if others persist. National responses run all the way from Brazil's open invitation to polluting industries[135] to Britain's appointment of a new cabinet level minister for environmental protection.[136] Recent bilateral and multilateral programs are the most encouraging. Among the former are the United States-Canadian program to clean up the Great Lakes and our agreement with Japan to exchange and jointly develop technological information.[137] Multinational programs include the marine oil discharge conventions of the Intergovernmental Maritime Consultive Organization, now before the U.S. Senate for ratification, NATO's program to eliminate intentional ocean oil discharges by 1975 and the Economic Commission for Europe's May 1971 Prague Symposium seeking to establish East-West cooperation on environmental programs.[138] The June 1972 Stockholm U.N. Conference on the Human Environment will bring in the developing nations for the first time.[139] One of the few operative international conventions, which bars the dumping of poisonous wastes from ships or planes in the northeast Atlantic Ocean, was signed February 12, 1972, by Great Britain, Norway, Belgium, France, Denmark, West Germany, Finland, Iceland, The Netherlands, Portugal, Spain and Sweden.[140]

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[132] Federal Water Pollution Act, ch. 758, 62 Stat. 1155 (1948), *as amended* 33 U.S.C. § 1151 *et seq.* (1970).

[133] Water Quality Control Act of 1965, Pub. L. No. 89-234, § 1(a), 79 Stat. 903 (1965), *as amended* 33 U.S.C.A. § 1151 *et seq.* (1970).

[134] Hines, *supra* note 93, at 802.

[135] N.Y. Times, Feb. 13, 1972, § 1 at 11.

[136] SECOND ANNUAL REPORT 28.

[137] *Id.* at 30.

[138] *Id.* at 30-31.

[139] *Id.* at 32.

[140] N.Y. Times, Feb. 16, 1972, at 6 C.

E. *State Statutes*

State responses to the environmental pollution problem vary widely but within categories show patterns attributable to the demands and incentives of federal legislation. State water pollution control legislation, like federal, started with measures to protect drinking water supplies.[141] This circumstance is responsible for the fact that until the recent trend toward separate boards, primary responsibility for control typically resided in state health departments. Where new boards have been created, they vary in size from three to 13 people who usually serve without pay.[142] Members are generally appointed by the governor and are typically from his cabinet, plus citizens confirmed by the state senate.[143] In many instances, persons representing industries that are or may be regulated are appointed.[144] Though the federal approval requirement for state standards tends to insure at least minimum conformity regardless of state board composition, the fine hand of industry self-interest shows through in some state statutes.[145]

Violations of state standards may come to an agency's attention through inspections, pollution monitoring or complaints.[146] Most state laws then call for a hearing,[147] though some only require a polluter to submit an abatement plan and may give him as long as seven years to put it into effect.[148] Where enforcement is required and fines are permitted, they may vary from $100 to $25,000 each.[149] In a number of states, each day of non-compliance may constitute a separate offense.[150] Most states also provide for injunctions against violators who have failed to comply with agency orders, and all allow judicial review of agency actions.[151] Each of the 50 states has established and received either full or qualified approval for interstate waterway water quality standards. All but seven have also established intrastate waters quality standards.[152]

Interstate pollution control compacts have been established under the compact clause of the Constitution.[153] The New York, New Jersey,

141 Hines, *supra* note 93, at 202-03.

142 Woodroof, *Pollution Control: Why Not Cost Allocation?*, 21 DRAKE L. REV. 133, 136 (1971).

143 *Id. See* ENVIRONMENTAL CONTROL 88-90.

144 ENVIRONMENTAL CONTROL 92-93.

145 Pennsylvania applies its act only to sewage and exempts wastes from coal mines, tanneries and municipal sewage systems existing when the act was passed. PA. STAT. ANN. tit. 71, § 540(4) (1962).

146 ENVIRONMENTAL CONTROL 124.

147 *Id.*

148 ALA. CODE tit. 22, § 140(9) (Supp. 1969).

149 ALASKA STAT. § 46.05.210 (Supp. 1971).

150 *E.g.*, FLA. STAT. ANN. § 403.161(3) (Supp. 1971); KY. REV. STAT. § 224.990 (1962).

151 ENVIRONMENTAL CONTROL 125.

152 SECOND ANNUAL REPORT 45.

153 U.S. CONST. art. I, § 10.

Connecticut, Tri-State Compact established in 1935[154] sets water standards and is empowered to issue abatement orders which are enforceable in the courts of the member states. The Ohio River Valley Water Sanitation Compact (ORSANCO) was approved by the states of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee and West Virginia in 1940 and went into operation in 1948.[155] It has both standard setting and enforcement powers, but its effectiveness is reduced by the requirement that its determinations command approval of a majority of all commissioners and of those of the affected state. There are a number of other state compacts with lesser power, including some involving partnership with the federal government.

The growth and form of state air pollution control legislation has paralleled the water pollution enactments. Typically, the state designates a state agency, such as the health department, or establishes a new commission to promulgate standards.[156] Most states permit local governments to regulate air pollution but their standards must be consistent with or more stringent than the state's.[157] As with the water boards, the air pollution control boards frequently contain industry members with the result that legislation or standards sometimes pay more attention to economic feasibility than to public health.[158] The more elementary codes deal primarily with the density of smoke emissions, but the trend is toward regulation of all deleterious emissions. A number of local codes are concerned with fuel standards and combustion efficiency and require licenses for the construction of potentially polluting facilities.[159] In spite of the near universality of federally inspired state standards,[160] the practice of local control severely handicaps enforcement in some states.[161] In such states, if the fallout from a plant in city A affects city B, enforcement must come from city A or not at all.[162] Inventive companies can take advantage of this circumstance and incorporate their own industrial communities to prevent local enforcement of controls.[163] As

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[154] Ch. 779, 49 Stat. 932 (1935); CONN. GEN. STAT. REV. §§ 25-55, 25-66 (1960); N.J. REV. STAT. §§ 32:18-1, 32:18-22 (1963); N.Y. PUB. HEALTH LAW § 1299, art. III(1) (McKinney 1971).

[155] 54 Stat. 752 (1940); ILL. ANN. STAT. ch. 111½, § 117 (Smith-Hurd 1966); IND. ANN. STAT. § 68-601 (1961); KY. REV. STAT. § 224.190 (1969); N.Y. PUB. HEALTH LAW § 1190 (McKinney 1971); OHIO REV. CODE ANN. § 6113.01 (Page 1954); PA. STAT. tit. 32, § 816.1 (1967); TENN. CODE ANN. § 70-401 (1955), *repealed*, acts 1971, ch. 33 § 1 (Apr. 6, 1971); W. VA. CODE ANN. § 29-1D-1 (1971).

[156] ENVIRONMENTAL CONTROL 82-83.

[157] *Id.*

[158] *See, e.g.*, Comment, *Air Pollution Control in Texas*, 47 TEX. L. REV. 1086, 1120 (1969).

[159] ENVIRONMENTAL CONTROL 86.

[160] SECOND ANNUAL REPORT 46.

[161] F. GRAD, PUBLIC HEALTH LAW MANUAL 16 (1970).

[162] ENVIRONMENTAL CONTROL 121.

[163] F. Grad, *The State's Capacity to Respond to Urban Problems: The State Constitution*, in

of January 1971, all states had enacted legislative authority to establish and promulgate emission standards.[164]

With the exception of the limited authority over air pollution exercised by the New York, New Jersey, Connecticut Interstate Sanitation Commission,[165] no air pollution control compacts are currently in effect, though a number are pending.[166] All are running into trouble in the Senate Subcommittee on Air and Water Pollution of the Committee on Public Works because of their alleged incompatibility with the 1967 Air Quality Act.[167] The main objection has been that the compact areas do not coincide with one or more of the air quality regions established by that Act.[168] The regions are considered by the Environmental Protection Agency to be areas having similar characteristics and air pollution problems. Both HEW and the Subcommittee have indicated that they will reject compacts which attempt to unify several massive air pollution problem areas.[169]

Individual states, of course, may fall far short of or greatly exceed the typical programs outlined above. At one extreme is Alabama which in April 1971 had to resort to its nuisance laws after a five day air pollution episode in Birmingham because its Air Pollution Control Act had no applicable standards.[170] At the other extreme are several of the major industrial states. California, for instance, enacted the first automotive emission laws[171] and set the stage for the National Emission Standards Act of 1965.[172] It has since been granted waivers permitting it to establish automotive emission standards significantly higher than those of the federal government.[173] Subsequently, California established a pesticide usage permit system and recently took a hand in the siting of electric power plants.[174] New York has been a leader in banning phosphates in detergents[175] and is one of three states with public corporations empowered to finance, construct and operate municipal sewage treatment

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THE AMERICAN ASSEMBLY, THE STATES AND THE URBAN CRISIS 46, 47 (A. Campbell ed. 1970).

164 SECOND ANNUAL REPORT 46.

165 CONN. GEN. STAT. REV. § 25-62(a) (Supp. 1971); N.Y. PUB. HEALTH LAW § 1299-m (McKinney 1971).

166 ENVIRONMENTAL CONTROL 138-39.

167 *Hearings on Air Pollution Compacts before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 90th Cong., 2d Sess. at 459-66 (1968).

168 H.R. Rep. No. 728, 90th Cong., 1st Sess. 24 (1967).

169 *Id.*

170 SECOND ANNUAL REPORT 41.

171 CAL. HEALTH & SAFETY CODE § 39052(a) (West Supp. 1971). *See also* §§ 39052.5, 39101-39106.

172 42 U.S.C. § 1857 f-1 *et seq.* (1970).

173 36 Fed. Reg. 8172 (1971).

174 CAL. PUB. UTIL. CODE § 2851 *et seq.* (West Supp. 1971).

175 SECOND ANNUAL REPORT 44.

plants.[176] Parenthetically, New York[177] and California[178] are also among the few states having legislation controlling the maximum decibel level for motor vehicles on public highways. In a Michigan experiment, partially treated municipal sewage is being used to reclaim formerly barren land for agricultural use. A subsoil drainage system returns clean water, filtered by the earth, to local aquifers.[179] The Illinois Public Utility Commission has granted a rate increase to Commonwealth Edison, partially conditioned upon specific abatement actions by that utility.[180] Subsurface disposal of liquid wastes without a public hearing and a permit has been banned in Colorado.[181] Emulating the Ruhr Basin Genossenschaften,[182] Vermont has become the first state to enact an effluent fee or pollution charge.[183] After July 1, 1972 (originally July 1, 1971), anyone not in compliance with the state's water quality standards may be granted a temporary discharge permit upon a showing that either he is making a bona fide effort to comply or he has no reasonable alternatives. Issuance of the permit depends upon the weighing of public benefit against water quality degradation. In consideration, the holder must pay a pollution charge deemed to approximate the damage done to other users of the waters.

F. *Unsolved Problems*

The governmental pollution control efforts outlined above suffer from many shortcomings. The most glaring is the lack of essential intra- and intergovernment coordination. On the federal level, highway construction support programs encourage the proliferation and use of the major source of air pollution, the motor vehicle, while the EPA tries to stem its effects. At the same level, the Department of Agriculture promotes insecticides and fertilizers which both pollute and make eutrophic our water sources. Before 1970, the Department of the Interior was charged with both the development of mining operations and the cleaning up of the mess that resulted.[184] Respecting the states, the water and air quality standards

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176 *Id.* at 56.

177 N.Y. VEH. & TRAF. LAW § 386 (McKinney 1970).

178 CAL. VEHICLE § 23130 (West 1971).

179 SECOND ANNUAL REPORT 59-60.

180 85 P.U.R. 3d 199 (Ill. Commerce Com. Docket No. 55149).

181 Colorado Water Pollution Control Commission Rules & Regulations for Subsurface Disposal Systems.

182 A program involving effluent charges, scaled in proportion to the quality and quantity of wastes discharged, the proceeds from which are used for large scale purification plants. One river, the Emscher, is used as a sewer while the Ruhr is kept clean. Factories and cities have an incentive to reduce waste emissions to the point where the net cost of their own treatment is less than the charges imposed by the Genossenschaft. 12 ARIZ. L. REV. 511, 534-36 (1970).

183 VT. STAT. ANN. tit. 10 § 912a (Supp. 1970).

184 78 Stat. 329 (1964) 42 U.S.C. § 1961 *et seq.* (1970). *See, e.g.*, 61 Stat. 913 (1947). 30 U.S.C.A. §§ 351-54 (1971).

that meet more or less uniform federal criteria can bear little relationship to local problems. Since pollution sources are largely local in character, enforcement must be local yet the cognizant local agencies generally operate without state or federal control. Thus the force of the national policy of environmental protection becomes so diffuse by the time it reaches the local level that it can be defeated by inept, uninterested or easily influenced officials. A stream cannot be cleaned up if half of the riparian owners treat their waste while the other half continue to dump untreated sewage. Centralized authority for local, regional, national and even international enforcement is the only practical and economical solution.

Last, but far from least, is the lack of enlightened anticipatory control over future pollution sources. The greatest explosion in environmental degradation occurred after World War II following the introduction of plastics, pesticides, synthetic fibers, detergents, enhanced fuels, artificial radioisotopes and the like. Many of these products are currently not recyclable by man or nature and thus accumulate in growing waste caches throughout the world. Since present control standards do not affect the character or output of these items and their progeny, but only seek to keep them from useable water courses and the air, the accumulation of untreated waste accelerates. While land and ocean dumps are not saturated today, it is important to reflect on the present unsatisfactory condition of rivers which were also once thought to be infinite waste receptacles. At some point, appropriate agencies must consider the effect and eventual disposition of new products, providing for the recycling of those that can be and limiting the production of those that cannot.

Respecting the control of pollution by industry, the foregoing regulatory programs are primarily punitive in their effect.[185] They require that companies comply with applicable standards or be subject to fines or injunctions. Either sanction results only after the lengthy legal processes designed to protect the innocent have ground to a conclusion.[186] In an attempt to speed compliance, intermediate hearings and permit systems provide for compromise of standards, often seriously diluting the goals sought.[187]

The reasons for industry's reluctance to comply and the motive forces behind its attempts to moderate or circumvent standards are economic in nature. Waste prevention or treatment systems are expensive and yet

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185 ENVIRONMENTAL CONTROL 248-50.

186 In United States v. Bishop Processing Co., 423 F.2d 469 (4th Cir. 1970), *cert. denied*, 398 U.S. 904 (1970), an order to cease operations terminated proceedings that had begun in 1965.

187 The Department of the Interior's guidelines for state water quality criteria were undermined by the ease with which regulatory agencies granted variances from effluent emissions standards. *See, e.g., Hearings on H.R. 13104 and H.R. 16076 (And Related Bills) Before the House Comm. on Public Works*, 89th Cong., 2d Sess., at 81 (1966).

add nothing but cost to the product. Those who avoid or delay such costs prevail in a market place which is not equipped to evaluate the social losses from environmental degradation. In apparent recognition of the economic drives to pollute, both the federal and state governments have long offered subsidies, mainly tax incentives, to industry to encourage pollution reduction.

IV. TAX INCENTIVES

A. *Federal*

The Tax Reform Act of 1969[188] offers rapid, 60-month amortization of new air or water pollution abatement facilities used in connection with older plants or properties as long as they are not profit producing.[189] State certification that the facility meets state standards is required to qualify for the accelerated amortization. The additional 20 per cent first-year depreciation allowance is also available. The amortization allowance is subject to recapture at ordinary income rates if the facility is later sold for a gain.[190] Though § 169 offers greater benefits for qualifying pollution abatement facilities than for non-qualifying facilities,[191] the whole effect of the 1969 Tax Reform Act has been to reduce industry incentives for any capital investment. Under prior tax law the approximate ultimate net cost of a $1000 capital investment, whether for pollution control or not, was $578. Under the present law, the cost of such a pollution control device will be $596. The least that can be said for the 1969 Act is that, while it reduces the incentive for all capital investments, it penalizes pollution control facilities the least. Even that advantage disappeared with the new 1971 tax law changes which restored the seven per cent investment credit for most new tangible personal industrial prop-

188 INT. REV. CODE of 1954, § 169.

189 *Id.* § 169(e).

190 *Id.* § 1245.

191 EFFECT OF SECTION 169 TAX BENEFITS ON INDUSTRIAL POLLUTION CONTROL FACILITY COSTS: TREATMENT OF ASSETS

	Under Tax Reform Act of 1969		
	Qualifying (§169)	Non-Qualifying	Prior to Tax Reform Act
Purchase Price	$1000	$1000	$1000
Investment Tax Credit			70
Total Depreciation	480	480	480
Present Value of Tax Credit and Depreciation	404	356	422
Net Cost of Facility	596	644	578

Table assumes: Useful life—15 years. Salvage value—less than 10 per cent. Tax rate—48 per cent. Discount rate—6 per cent. No additional first year depreciation or state tax consequences. Depreciation—sum of the years digits. Adapted from 12 ARIZ. L. REV. 511, 533 (1970).

erty but not that which qualifies for the special five year amortization of § 169.[192]

B. *State*

As shown in the table following this article,[193] at least 31 states use tax relief as an incentive for the installation of industrial pollution abatement facilities. Most relief takes the form of an exemption from ad valorem property taxes with qualification being dependent upon the form and use of the pollution abatement facility. The exemptions in Indiana[194] and North Carolina,[195] for example, apply only to purification and treatment systems used exclusively for pollution control. Such narrowly circumscribed relief tends to discourage investment in pollution abating process improvements and other treatment means incorporating some measure of economic utility to the user. Slightly broader are the "primary purpose" requirements of states like Georgia[196] and Ohio,[197] though the definition of "primary purpose" presents obvious difficulties.[198] If a facility produced optimum abatement but its installation could primarily be justified by process improvement economics or saleable waste recovery, tax relief would probably be denied under these statutes. Apparently recognizing that the objective of pollution control legislation is to improve the environment rather than sell black boxes,[199] several states, including Illinois,[200] Michigan[201] and New Hampshire,[202] related tax incentives to that portion of any new property used for abatement purposes.

The form in which property tax relief is granted also varies. Some states exempt control facilities from property taxes to a limited extent[203] or for a limited period,[204] while others, including Ohio,[205] exclude the facility for tax purposes as long as it qualifies under pollution control

192 INT. REV. CODE of 1954, § 38.

193 The general form of the table is taken from 12 ARIZ. L. REV. 511, 526-28 (1970).

194 IND. ANN. STAT. § 64-236 (Supp. 1972).

195 N.C. GEN. STAT. § 105-278(11) (1972).

196 GA. CODE ANN. § 92.201.1 (Supp. 1971).

197 OHIO REV. CODE ANN. §§ 6111.01, 5709.20 (Page Supp. 1971). *See also* MICH. STAT. ANN. §§ 323.351 (1)(a), 336.1 (1) (1967); MINN. STAT. ANN. § 272.02(15) (Supp. 1972); N.J. REV. STAT. § 54:4-3.56 (Supp. 1969-70).

198 In Malat v. Riddell, 383 U.S. 569 (1966), "primarily" was construed to mean "of first importance."

199 From an electronic term referring to boxes whose contents are not specified.

200 ILL. ANN. STAT. ch. 120, § 502a-1 (Smith-Hurd 1970).

201 MICH. STAT. ANN. §§ 323.354 (4)(1), 336.4 (4)(1) (1967).

202 N.H. REV. STAT. ANN. § 149:5a (1964). *See also* FLA. STAT. ANN. § 193.621 (1971); IDAHO CODE ANN. § 63-105T (Supp. 1971).

203 *E.g.*, MONT. REV. CODE ANN. §§ 69-3923 (1970); S.D. CODE § 10-6-35.2, .3 (Supp. 1972).

204 *E.g.*, N.H. REV. STAT. ANN. §§ 149:5-a, -b (1964).

205 OHIO REV. CODE ANN. §§ 5709.25(A), (B), 6111.34, .35 (Page Supp. 1971). *See* table at note 193, *supra* for others.

laws. Characteristically, property tax relief extends to real property and machinery needed for the facility, an exception being Indiana[200] which permits depreciation of tangible personal property only.

While property taxes offer the favorite incentive, several states extend their concessions into other revenue areas. In Ohio, for instance, the transfer of tangible property that is all or part of a pollution control facility is not a sale for sales or use tax purposes.[207] At least seven other states have comparable provisions.[208] A number of states also offer credits against income taxes or franchise taxes based on income. The most generous is Oklahoma which offers an annual income tax credit equal to 20 per cent of the cost of the abatement facility up to a maximum of 100 per cent.[209] Washington and Oregon have 50 per cent maximum tax credits which may be accumulated at the rate of two and five per cent per year, respectively.[210] Connecticut has a five per cent, one-shot tax credit for the planning and construction costs in the tax year.[211] The alternatives are to offer 60-month cost amortization, as does Arizona,[212] a 100 per cent first year deduction, as does Massachusetts,[213] or a choice of writeoff methods, as do California, New York and Virginia.[214] For states that measure their franchise taxes by capital stock and surplus, such as North Carolina,[215] or the higher of that value and net income, such as Ohio,[216] relief is provided by excluding the value of the tangible portion of the facility from net assets.

The value to industry of state tax incentives varies considerably. Ignoring federal income tax benefits, the present cash value of the Oregon tax credit for new pollution control facilities is 36.8 per cent of the pur-

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[206] IND. ANN. STAT. §§ 64-236, -241 (Supp. 1972).

[207] OHIO REV. CODE ANN. §§ 5709.25(C), 6111.37 (Page Supp. 1971).

[208] *See* table at note 193, *supra.*

[209] OKLA. STAT. ANN. tit. 63 § 2004 (Supp. 1971-72), tit. 32, § 922 (1970).

[210] WASH. REV. CODE ANN. § 82.34.050(2) (Supp. 1971); ORE. REV. STAT. § 316.097 (1969).
The Oregon tax credit is graduated as follows:

Portion of facility cost allocable to pollution control	Yearly tax credit	Credit limit
80 per cent or more	5 per cent	50 per cent
60 to 80 per cent	4 per cent	40 per cent
40 to 60 per cent	3 per cent	30 per cent
20 to 40 per cent	2 per cent	20 per cent
0 to 20 per cent	1 per cent	10 per cent

[211] CONN. GEN. STAT. ANN. §§ 12-265b, -265c (1972).

[212] ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1971-72).

[213] MASS. ANN. LAWS ch. 63, § 38D (1971).

[214] CAL. REV. & TAX CODE §§ 17226, 17226.5, 24372, 24372.5 (West 1970); N.Y. TAX LAW § 208(9)(g) (McKinney 1966) or §§ 210 (12)(f), 701(d)(6) (McKinney Supp. 1971-72); VA. CODE ANN. § 58-81.1 (1969).

[215] N.C. GEN. STAT. § 105-122(b) (Supp. 1971).

[216] OHIO REV. CODE ANN. §§ 5709.25(C), 6111.36 (Page Supp. 1971).

chase price.[217] At the opposite extreme is the Arizona franchise tax depreciation provision which offers a present value return increment over normal amortization of only 0.8 per cent.[218] From a practical point of view, therefore, the out-of-pocket costs of such facilities, which are required by most states to be non-productive, must be largely or wholly borne by the purchaser.

C. *Criticism*

Tax incentives are an integral, perhaps a major, part of our industrial pollution control programs. Considering the dynamics of the market place, companies are unlikely to spend to reduce pollution voluntarily, except perhaps insofar as is necessary to offset adverse customer reaction and create a good "corporate citizen" image. Enforcement of standards through penalties or injunctions involves recourse to slow and uncertain legal processes. Alternate inducements such as direct grants and emission charges are virtually untried.[219] Most of our industrial pollution control eggs then are in the tax incentive basket. The direct incremental cost of those incentives in diverted tax revenues is estimated to increase from $15 million in 1970 to $120 million in 1979 on the federal side.[220] The state costs are generally significantly lower.[221] How effective are these expenditures likely to be? Is our dependence on tax incentives misplaced?

The most frequently asserted advantage for tax incentives is that they promote private decision making and keep government bureaucracy out of private industrial operations.[222] That assertion is open to several objections. In the first place, it is usually offered to show the advantage of tax incentives over subsidies. While it is true that many subsidies involve elaborate governmental structures, they are not an essential concomitant of a subsidy. Utilization of a tax incentive requires that state facility certification be applied for, granted and forwarded to the taxing authority.

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[217] Assumes an after-tax investment return of six per cent and disregards federal tax consequences.

[218] *Id.*

[219] *See* discussion at note 183, *supra.*

[220] S. REP. NO. 552, 91st Cong., 1st Sess., at A-405 (1969):

REVENUE LOSSES ARISING FROM POLLUTION ABATEMENT INCENTIVES:
(In millions of dollars)

Senate Version (As Adopted)	1970	1971	1972	1974	1979
	15	40	70	115	120

[221] *See* discussion at notes 217 and 218, *supra.* The 1970 revenue loss to Ohio from air pollution control facility exemptions is estimated to be $6.3 million. Reitze & Reitze, *Tax Incentives Don't Stop Pollution*, 57 A.B.A.J. 127, 128 (1971).

[222] Surrey, *Tax Incentives—Conceptual Criteria for Identification and Comparison with Direct Government Expenditures*, TAX INCENTIVES, SYMPOSIUM CONDUCTED BY THE TAX INSTITUTE OF AMERICA Nov. 20-21, 1969, 3, 17-18 (1971). [hereinafter cited as SYMPOSIUM].

Then the tax relief must be applied for on the appropriate taxing forms. At that point, if all is in order, money in the taxpayer's hands previously earmarked for tax payments is freed, and the state is out of pocket the same amount. There is absolutely no practical reason why the same result cannot be achieved with the same amount of documentation by payment of a subsidy check rather than approval of a tax deduction. The economic effect is the same, and no more government interference is involved in one process than the other.

In the second place, tax incentives, being limited to facilities exclusively for, or having the primary purpose of, reducing pollution,[223] relate solely to non-productive facilities. The maximum return that a company can expect from state and federal sources on such tax prompted investments varies from 40.4 per cent up to a maximum of 71.2 per cent (excepting Oklahoma) with the average being nearer the bottom figure.[224] In most states, therefore, a purchaser will be making a non-productive investment of the order of one half the cost. Common sense and responses to industry questionnaires[225] compel the conclusion that existing tax incentives do not induce investments that would not otherwise be made.[226]

Thirdly, tax incentives do involve the government, and the wrong branch of government, in business decisions. In the ordinary course, a direct federal subsidy, as opposed to a tax incentive, would be proposed by the Environmental Protection Agency and considered by the appropriate House and Senate Committees on water and air pollution problems.[227] State subsidies would go through a similar procedure at the state level. These committees through constant exposure to the problem of pollution have developed an expertise in the field and a knowledge of how their programs relate to correlative government efforts. Equally important, they keep track of the effectiveness of their past efforts as an aid in developing new programs. Tax measures, on the other hand, are filtered through tax oriented committees[228] that are responsible not for pollu-

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223 The federal income tax incentive is based on state certification of pollution abatement facilities, INT. REV. CODE 1954, § 169(d)(2). State certification is generally limited to non-productive facilities. *See* discussion at notes 194 to 202, *supra.*

224 The maximum figure equals the total federal incentive value given in the table at note 191, *supra,* plus the Oregon incentive value given in the discussion at note 216, *supra.* The minimum figure is the federal incentive value alone.

225 Only one of 66 of America's largest firms indicated that it gave material consideration to tax devices during investment review. G. Halverson, Attitude of Corporate Executives Toward Use of Tax Devices as Economic Conditioners 133 (1968) (unpublished thesis submitted to Indiana University School of Business).

226 *See* Surrey, *supra* note 222, at 15-18.

227 *E.g.,* House Committee on Public Works and Subcommittee on Air and Water Pollution of the Senate Committee on Public Works.

228 *E.g.,* House Ways and Means Committee and Senate Finance Committee.

tion control but for revenue. Their oversight of tax incentive programs is related not to program success but to its effect on government receipts.

The problem of government control is further complicated at the administrative level where tax incentive subsidies are administered by the state and federal tax departments. Again, these agencies are concerned with revenue and not pollution control and are not likely to consider control effectiveness in deciding whether to allow or question a credit or deduction. If a tax prompted program fails, tax departments cannot be held accountable. It is not their job to know or care whether such a program is wise or foolish. Having no one accountable leads to the "we're doing all we can" syndrome which blames the problem rather than the program. While intrusion into private decision making by government pollution experts may be no less offensive than intrusion by the tax arm, the effect on the environment would be much more salutary.

The use of the tax system to provide program subsidies has other insidious consequences. The cost of such subsidies tends to be hidden and to continue beyond its effectiveness. Budgetary expenditures are usually reviewed and exposed to public and governmental scrutiny annually. Tax incentives are reviewed only infrequently[229] and then by the wrong people. None of the expenditure control devices enacted by Congress in any way include tax incentives.[230] It is impossible in evaluating the annual expenditures that can or should be made to control pollution to include the revenue costs. Any doubt that a tax incentive is a cost should be dispelled by the reflection that the resulting revenue losses must be made up either by a broadening of the revenue base, or an increase in the tax rate, or both. To illustrate the enormity of this process, the Treasury Department Tax Expenditure Budget published in 1968 estimated the annual cost to federal revenues of tax incentives at nearly $45 billion[231] which equalled 65 per cent of total federal individual income tax collections that year.[232] No comparable figures are available for the overall cost of state tax incentives.[233] Ohio air pollution control tax incentive cost was estimated to be $6.3 million in 1970.[234]

Perhaps the most serious indictment of pollution control tax incentives is their poor targeting. In the first place, as presently structured, they all relate either to equipment used exclusively for pollution abate-

229 Surrey, *supra* note 222, at 28-29.

230 *Id.* at 29.

231 Aaron, *Inventory of Existing Tax Incentives—Federal*, in SYMPOSIUM 39, 42-44. As presented, the Treasury Department's original budget has been increased by alcohol and tobacco excise taxes and the exclusion of imputed rent (adding $7,709 million to the original total).

232 STATISTICAL ABSTRACTS OF THE UNITED STATES (1968).

233 George Kinnear, Washington State Revenue Director, estimates tax relief already granted will cost that state $98 million in revenues over the next 25 years. Wall Street Journal, August 26, 1970, at 1. *See* discussion at note 210, *supra.*

234 *See* note 221, *supra.*

ment or to non-productive portions of equipment used primarily for the same purpose. Tying federal tax relief to state certification makes this limitation universal. In many cases, this limitation inflates control costs and actively discourages investment at the most effective point in the process. The pulp and paper industry, for instance, is a major polluter having accounted for 17 per cent of the suspended solids and 27 per cent of the biochemical oxygen demand in 1964 U.S. industrial water wastes.[235] By changing from the older sulfite process to the modern sulfate process, waste water output is reduced by 93 per cent; yet such process changes are not eligible for pollution control tax incentives.[236] Fuel changes, another non-qualifying expenditure, are estimated to be the least costly means of reducing sulfur oxide emissions.[237] Other examples abound. Recovery and reuse of pollutants is disqualified for tax relief because of the resulting economic benefits. Land, being non-depreciable, though an effective dispersal and treatment agent for some industries, is a non-tax compensated investment.[238] The use of higher stacks or regulated stream discharges for greater dispersion does not meet most state statutory facility definitions.[239] Research expenditures to find non-polluting processes are equally unrewarding.

Tax incentives relate only to capital expenditures by individual taxpayers. In circumstances where a company has the choice between systems whose ultimate costs are the same, it is encouraged to buy the one with the highest initial capital cost regardless of its pollution abatement efficiency. In crowded areas, manufacturers are induced to buy their own control systems rather than participate in more efficient municipal treatment programs if the after-tax costs of the former are lower. In every instance of a conflict, tax incentives will favor the lowest after-tax cost over pollution control effectiveness.

The only exceptions to the uniform application of industrial pollution abatement tax incentives are the differences between state plans. But these exceptions are unrelated to the major factor of federal tax relief and are more apt to result from political rather than pollution considerations. Therefore, present tax incentives do not reflect the fact that Los Angeles and New York are more polluted than Charlottesville or Grand Rapids or that more than half of all air pollutants are produced by transportation. The tax system democratically gives a plant assembling high-fi equipment in America's cleanest county and a steel mill in Pittsburgh the same incentive to reduce pollution.

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235 FIRST ANNUAL REPORT 32.

236 *Id.* at 33.

237 Wilson, *Tax Assistance and Environmental Pollution*, in SYMPOSIUM 247, 251.

238 *See* discussion at note 179, *supra*; Roberts, *River Basin Authorities: A National Solution to Water Pollution*, 83 HARV. L. REV. 1527, 1533 (1970).

239 SYMPOSIUM 252.

The remaining pollution control tax incentive flaws are typical of most of that genre. They are prejudiced against firms with small incomes and do not reach those with no incomes or tax exempt organizations. Over 90 per cent of the firms in industries facing the greatest abatement problems—foods, paper, chemicals, petroleum refineries and primary metals—are classified as small businesses.[240] A company struggling to stay alive is not likely to make pollution abatement one of its investment choices. Maximum tax rewards go to those most able to bear the cost in the first place which has the interesting effect of providing the most incentive where the least should be needed.

D. *Suggestions*

The only advantage of a tax incentive for pollution control seems to be that it is *a* program. The outlines of alternative and better programs are implicit in the foregoing discussion. Pollution is largely a product of technology and its abatement is a technical problem. From top to bottom, the design and control of abatement programs should be in the hands of knowledgeable agencies whose only goal is environmental protection. These programs should be devised at the national level to avoid local political and income differences but must operate at the local level where pollution starts to make optimum use of the nation's resources. The representative procedure of Congressional scrutiny should insure consideration of appropriate priorities. Tax incentives should be avoided as improperly managed and impossible to target. At the same cost, direct subsidies can be used where they will do the most good. Subsidies should not only be directed to stop pollution where it is worst but also to divert demand to products that are least harmful to the environment.[241] A program of guaranteed loans and other financial and technical assistance, such as is available from the Small Business and Economic Development Administrations, will help small, low-income companies.

But subsidies and loans are not enough. Mere failure to apply for them would defeat such a program, and, unless subsidies at least equal the cost of compliance with abatement standards, the economic advantage remains with the polluter. The balance must be swung by penalty charges which increase in proportion to the damage done to, or the cost of repairing, the environment. The proper balance is achieved when the value of the subsidy plus the reduction in penalty just exceeds the cost of meeting applicable standards. The value of the subsidy component is related to the social and economic value inherent in sustaining new and marginal producers and in minimizing the incremental product price burden on the customers of major industrial polluters.

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240 *Id.* at 254.

241 *See* discussion at note 65, *supra.*

V. CONCLUSIONS

The environmental crisis is real; our reactions to it are not. We are faced at best with a slow decline in the quality of life, at worst with a catastrophe. Of all possible environments, the one habitable by man is unique. Temperatures in the universe vary from -460° F. to billions of degrees. Naked man can exist from 50° to 115°. His metabolism requires oxygen at approximately 14.7 pounds per square inch unmixed with most other gases. When carbon dioxide, a normal product of animal metabolism and all combustion processes, reaches five per cent, nausea sets in.[242] Both the earth's breathable atmosphere and its temperature range result from life processes, the first directly from photosynthesis, the second from the greenhouse effect of the right amount of carbon dioxide. Pollution poisons plants and reduces photosynthesis. Reduced photosynthesis and increased combustion increases carbon dioxide and surface temperatures. The possible consequences are many and may not be open to choice: suffocation, destruction of our food and water sources, melting of the ice caps with terrestrial flooding, a new ice age or simply a slow decline in the quality of the environment that supports civilization.

The situation is not hopeless. We can maintain the status quo, the least we owe posterity, if we stop polluting. And that doesn't mean just moving the trash around; there aren't enough places to store much more of it that are not already required for habitation and water and food production. What is needed is a mobilization of world wide enthusiasm and effort such as that which won World War II. For the right cause, we could forego luxuries and unite in a common cause. This crisis is different of course; the goal is not just four years off But then victory this time is not merely desirable, it is essential; not merely for personal principles and national honor, but for life.

Our present efforts are inadequate. They reflect a lack of appreciation for the seriousness of the problem and the ways to solve it. They are little more than political busy work to quiet the restless: unrealistic standards, unused penalties, tax incentives that don't motivate. Much has been said above about standards. Essentially they are intended not to prevent the production of pollution but to divert it from the water and air. Almost none purport to control the production of useful products that make harmful waste. Even if present methods freeze environmental degradation at current levels, the quality of life, already unsatisfactory in much of the world, will decline as population increases. Standards must be designed not only to reduce new pollution but also to clean up the existing mess. They must be flexible enough to include present processes and control new ones before they cause harm. With the history of radium watch dials, DDT, thalidomide, non-degradable detergents, hex-

242 TECH. REPORT NO. 144, US. NAVAL CIVIL ENGR. LAB. 4 (1961).

achlorophene and London smogs behind us, we should realize that we may not be as lucky next time.

The miracle of America is largely the gift of our free enterprise system. In its assault on the market place, American industry has spawned jobs, wealth and material comforts. But along with its virtues, it can be one of the most immoral creations ever devised. Uncontrolled, it has been known to cheat, debase, enslave, suborn and despoil. In the first half of this century, the history of domestic government consisted largely of its efforts to control the exploitive instincts of industry. Labor laws have *forced* fair treatment of workers; security laws have *forced* fair treatment of investors; pure food and drug laws have *forced* the maintenance of quality standards. What possible rationale is there in believing that nominal fines and tax incentives will induce industry to control pollution at its own cost and at the peril of the market place? Until we treat industrial pollution at least as seriously as we treat a misleading financial statement, there is no hope of controlling it.

Governments react to pressure. An aroused public can produce change, and it is the public that suffers from pollution. We must demand, through our representatives and through our ballots, a mobilization of research, technical and political facilities to forestall the impending environmental crisis. Affluence has been purchased at the price of a huge debt to nature. The successful discharge of the debt will require not only money and effort but also the essential catalyst of rational, informed social action.

Walker B. Lowman

TYPICAL STATE POLLUTION CONTROL TAX INCENTIVES STATUTES

Tax Treatment of Qualifying Industrial Pollution Abatement Facilities

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Alabama		Air and Water ALA. CODE tit. 51, § 2(s) (Supp. 1969). Exempted.	Air and Water ALA. CODE tit. 51, §§ 786(34), 789 (Supp. 1969). Exempted.
Alaska	ALASKA STAT. §§ 43.20. 010(b), .26.010 (1962). Applies to all new facilities. Up to 50% tax credit for not over 10 years.		
Arizona	Air and Water ARIZ. REV. STAT. ANN. § 43-123.02 (Supp. 1971-72). 60-month amortization.		
Arkansas	Severance tax credit to oil and gas producers who dispose of brine in approved manner. ARK. STAT. ANN. §§ 84-2113 to -2121 (Supp. 1969).		
California	Air and Water CAL. REV. & TAX CODE §§ 17226, 17226.5, 24372, 24372.5 (West 1970). Option of 60-month amortization or depreciation.		

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Connecticut	Air and Industrial Waste of Water, Gas and Power Companies CONN. GEN. STAT. ANN. §§ 12-265b, -265c (1972). One 5% tax credit.	Air and Water CONN. GEN. STAT. ANN. §§ 12-81(51), -81(52) (1972). Exempted.	Air and Waste Treatment CONN. GEN. STAT. ANN. § 12-412(u), (v) (Supp. 1972). Exempted.
Florida		Air and Water FLA. STAT. ANN. § 193.621 (1971). Valued as salvage.	
Georgia		Air and Water GA. CODE ANN. § 92-201.1 (Supp. 1971). Exempted.	Air and Water GA. CODE ANN. § 92-3403aC.(2)(t.1) (Supp. 1971). Exempted.
Idaho		Air and Water IDAHO CODE ANN. § 63-105T (Supp. 1971). Exempted.	
Illinois		Air and Water ILL. ANN. STAT. ch. 120, § 502a-1 (Smith-Hurd 1970). Non-productive value exempted.	

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Indiana		Air and Industrial Waste IND. ANN. STAT. §§ 64-236, -241 (Supp. 1971). Exempted.	
Louisiana	General ten year ad valorem exemption for new industrial facilities includes those for pollution abatement. CONST. ART. 10 § 4.10 (West Supp. 1972).		
Maine		Air and Water ME. REV. STAT. ANN. tit. 36, § 656(1)(E) (Supp. 1972). Exempted.	Air and Water ME. REV. STAT. ANN. tit. 36, § 1760(29), (30) (Supp. 1972). Exempted.
Massachusetts	Industrial Waste (including air) MASS. ANN. LAWS ch. 63, § 38D (1971). 100% first year deduction from income.		
Michigan		Air and Water MICH. COMP. LAWS ANN. §§ 323.354(4)(1), 336.4(4)(1) (1967). Exempted.	Air and Water MICH. COMP. LAWS ANN. §§ 323.354(4)(2), 336.4(4)(2) (1967). Exempted.

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Minnesota		Air and Water MINN. STAT. ANN. § 272.02(15) (Supp. 1971). Exempted.	
Missouri			Air and Water MO. ANN. STAT. § 144.030.3(13), (14) (Supp. 1971-72). Exempted.
Montana		AIR MONT. REV. CODES ANN. §§ 69-3923 (1970), 84-302 (Supp. 1971). Reduced from 40% to 7% of full value.	
New Hampshire		Air and Water N.H. REV. STAT. ANN. §§ 149:5-a, :5-b (1964). 25-year exemption.	
New Jersey		Air and Water N.J. REV. STAT. § 54:4-3.56 (Supp. 1969-70). Exempted.	

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
New York	Air and Water N.Y. TAX LAW § 208(9)(g) (McKinney 1966). 100% first year deduction from income. or N.Y. TAX LAW §§ 210(12)(f), 701(d)(6) (McKinney Supp. 1971-72). 1% first year tax credit.	Air N.Y. REAL PROP. TAX LAW § 481 (McKinney Supp. 1971-72). Exempted.	
North Carolina	Air and Water N.C. GEN. STAT. § 105-122(b) (Supp. 1971). Cost treated as deductible reserve.	Water N.C. GEN. STAT. §§ 105-296(11), -297(16) (1965). Exempted.	
Ohio	Air and Water OHIO REV. CODE ANN. §§ 5709.25(C), 6111.36 (Page Supp. 1970). Excluded in determining value of capital stock and surplus.	Air and Water OHIO REV. CODE ANN. §§ 5709.25(A), (B), 6111.34-.35 (Page Supp. 1970). Exempted.	Air and Water OHIO REV. CODE ANN. §§ 5709.25(C), 6111.37 (Page Supp. 1970). Exempted.

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Oklahoma	Air and Water OKLA. STAT. ANN. tit. 63, § 2004 (Supp. 1971-72), tit. 82, § 922 (1970). 20% credit yer year to 100% maximum.		
Oregon	Air and Water ORE. REV. STAT. §316.097 (1969). 5% credit per year to 50% maximum.	Air and Water ORE. REV. STAT. § 307.405 (1969). Exempted.	
Rhode Island		Air and Water R.I. GEN. LAWS. ANN. § 44-3-3(22) (1971). Exempted	
South Carolina		Air and Water S.C. CODE ANN. § 65-1522(45.1) (Supp. 1971). Exempted.	
South Dakota		Air and Water S.D. Code § 10-6-35.2, .3 (Supp. 1971). 75% first year and 50% second year reduction in taxable value.	

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Tennessee		Air and Water TENN. CODE ANN. § 67-512 (Supp. 1971). Exempted.	
Vermont		Air and Water VT. STAT. ANN. tit. 10, § 369 (Supp. 1970), tit. 32 § 3802(12) (1969). Exempted.	
Virginia	Air and Water VA. CODE ANN. § 58-81.1 (1969). Option of 60-month amortization or depreciation.		
Washington	Air and Water WASH. REV. CODE ANN. § 82.34.050(2) (Supp. 1971).		Air and Water WASH. REV. CODE ANN. § 82.34-050(1) (Supp. 1971).
	Election between sales and use tax exemption and 2% (maximum 50%) credit against franchise and sales tax.		

State	Income or Franchise Tax	Property Tax	Sales/Use Tax
Wisconsin	Air and Water WIS. STAT. ANN. § 71.04(2b) (Supp. 1971-72). Option of one year deduction, 60-months amortization or depreciation.	Air and Water WIS. STAT. ANN. § 70.11(21) (Supp. 1971-72). Exempted.	
Wyoming		Air WYO. STAT. ANN. § 35-501 (Supp. 1969). Exempted.	